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Southeast Pennsylvania Ozone Stakeholders Meeting - May 30 and 31, 1996
Guide to Emission Tables

The attached tables report ozone precursor emissions for the Philadelphia-Wilmington-Trenton ozone nonattainment area, and surrounding States. All emission values are for 1990 and are reported as ozone season daily values. The data source for all summaries is the Ozone Transport Assessment Group data base, with some adjustments to incorporate recent changes made by the Pennsylvania Department of Environmental Protection.

Table 1 - 1990 Ozone Season Daily Emissions for the Philadelphia NAA
Five County Pennsylvania Area Only
Tier 2 Source Category Summary

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Pennsylvania Counties
All Counties
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All Counties
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Pennsylvania Counties
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Table 6 - Baltimore Nonattainment Area Ozone Season Daily 1990 Emissions

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Table 8 - Ozone Transport Commission State NO_x Emissions

Table 1
1990 Ozone Season Daily Emissions for the Philadelphia NAA from Pennsylvania Counties

Source Category	Daily Emissions (tons/day) VOC	NOx	CO
FUEL COMB. ELEC. UTIL.	**0.96**	**74.23**	**6.06**
Coal	0.17	38.79	1.48
Oil	0.45	25.65	3.10
Gas	0.01	5.06	0.39
Other	0.00	0.37	0.01
Internal Combustion	0.33	4.37	1.07
FUEL COMB. INDUSTRIAL	**0.83**	**76.00**	**9.31**
Coal	0.02	4.78	0.14
Oil	0.04	10.28	0.88
Gas	0.29	42.81	5.21
Other	0.00	0.70	0.02
Internal Combustion	0.48	17.44	3.07
FUEL COMB. OTHER	**1.03**	**26.82**	**5.78**
Commercial/Institutional Coal	0.00	0.78	0.03
Commercial/Institutional Oil	0.32	10.86	2.59
Commercial/Institutional Gas	0.65	13.59	2.70
Misc. Fuel Comb. (Except Residential)	0.05	0.72	0.16
Residential Other	0.00	0.86	0.31
CHEMICAL & ALLIED PRODUCT MFG	**14.80**	**0.09**	**0.02**
Organic Chemicals	8.78	0.00	0.00
Inorganic Chemicals	0.13	0.08	0.02
Polymers & Resins	0.67	0.01	0.00
Paints, Varnishs, Lacquers, Enamels	1.58	0.00	0.00
Pharmaceuticals	0.85	0.00	0.00
Other Chemicals	2.79	0.00	0.00
METALS PROCESSING	**0.62**	**1.47**	**35.96**
Non-Ferrous Metals Processing	0.15	0.00	0.00
Ferrous Metals Processing	0.47	1.46	35.96
PETROLEUM & RELATED INDUSTRIES	**21.53**	**9.95**	**17.87**
Petroleum Refineries & Related Industries	21.23	9.79	17.71
Asphalt Manufacturing	0.30	0.16	0.16
OTHER INDUSTRIAL PROCESSES	**2.31**	**2.79**	**0.58**
Agriculture, Food, & Kindred Products	1.53	0.02	0.00
Wood, Pulp & Paper, & Publishing Products	0.07	0.00	0.00
Rubber & Miscellaneous Plastic Products	0.61	0.00	0.00
Mineral Products	0.04	2.77	0.58
Machinery Products	0.06	0.00	0.00
Miscellaneous Industrial Processes	0.00	0.00	0.00
SOLVENT UTILIZATION	**223.41**	**0.03**	**0.01**
Degreasing	15.94	0.00	0.00
Graphic Arts	20.65	0.00	0.00
Dry Cleaning	0.77	0.00	0.00
Surface Coating	147.45	0.03	0.01
Other Industrial	3.16	0.00	0.00
Nonindustrial	35.45	0.00	0.00

Table 1
1990 Ozone Season Daily Emissions for the Philadelphia NAA from Pennsylvania Counties

Source Category	Daily Emissions (tons/day) VOC	NOx	CO
STORAGE & TRANSPORT	**46.22**	**0.00**	**0.00**
Bulk Terminals & Plants	0.65	0.00	0.00
Petroleum & Petroleum Product Storage	4.73	0.00	0.00
Petroleum & Petroleum Product Transport	14.43	0.00	0.00
Service Stations: Stage I	4.19	0.00	0.00
Service Stations: Stage II	19.57	0.00	0.00
Service Stations: Breathing & Emptying	1.67	0.00	0.00
Organic Chemical Storage	0.39	0.00	0.00
Organic Chemical Transport	0.59	0.00	0.00
WASTE DISPOSAL & RECYCLING	**22.05**	**1.69**	**6.52**
Incineration	1.59	1.63	5.29
Open Burning	0.22	0.06	1.24
POTW	7.78	0.00	0.00
TSDF	12.30	0.00	0.00
Landfills	0.16	0.00	0.00
HIGHWAY VEHICLES	**241.40**	**146.32**	**1,763.97**
Light-Duty Gas Vehicles & Motorcycles	216.24	117.11	1,575.65
Light-Duty Gas Trucks	17.84	10.03	133.09
Heavy-Duty Gas Vehicles	3.71	1.93	43.32
Diesels	3.61	17.26	11.90
OFF-HIGHWAY	**88.05**	**99.82**	**748.24**
Non-Road Gasoline	69.89	9.36	674.08
Non-Road Diesel	9.83	66.72	44.78
Aircraft	7.19	8.16	27.11
Railroads	1.15	15.57	2.28
MISCELLANEOUS	**2.31**	**0.29**	**12.58**
Other Combustion	2.31	0.29	12.58
TOTAL	**666**	**440**	**2,607**

Table 2
1990 Ozone Season Daily Emissions for the Philadelphia NAA

Source Category	Daily Emissions (tons/day) VOC	NOx	CO
FUEL COMB. ELEC. UTIL.	**8.14**	**367.43**	**28.25**
Coal	3.93	215.18	10.91
Oil	1.12	60.48	6.33
Gas	0.28	17.64	1.35
Other	0.03	9.95	0.28
Internal Combustion	2.79	64.19	9.38
FUEL COMB. INDUSTRIAL	**4.30**	**176.87**	**37.57**
Coal	0.03	9.55	0.43
Oil	1.41	23.45	2.30
Gas	2.30	123.71	31.42
Other	0.02	2.01	0.20
Internal Combustion	0.54	18.15	3.21
FUEL COMB. OTHER	**1.93**	**38.28**	**12.25**
Commercial/Institutional Coal	0.00	0.80	0.03
Commercial/Institutional Oil	0.46	14.15	3.08
Commercial/Institutional Gas	0.75	18.47	3.74
Misc. Fuel Comb. (Except Residential)	0.06	0.98	0.19
Residential Wood	0.49	0.05	4.08
Residential Other	0.16	3.83	1.14
CHEMICAL & ALLIED PRODUCT MFG	**52.64**	**10.85**	**30.45**
Organic Chemicals	15.99	0.06	2.54
Inorganic Chemicals	1.64	0.28	27.52
Polymers & Resins	2.92	0.02	0.00
Agricultural Chemicals	0.01	0.00	0.00
Paints, Varnishs, Lacquers, Enamels	1.58	0.02	0.00
Pharmaceuticals	1.13	0.00	0.13
Other Chemicals	29.37	10.47	0.26
METALS PROCESSING	**1.69**	**1.60**	**35.97**
Non-Ferrous Metals Processing	0.36	0.00	0.00
Ferrous Metals Processing	1.32	1.46	35.96
Metals Processing NEC	0.02	0.13	0.01
PETROLEUM & RELATED INDUSTRIES	**31.51**	**10.84**	**34.28**
Petroleum Refineries & Related Industries	31.08	10.52	33.98
Asphalt Manufacturing	0.44	0.32	0.30
OTHER INDUSTRIAL PROCESSES	**28.44**	**4.25**	**0.59**
Agriculture, Food, & Kindred Products	4.41	0.02	0.00
Textiles, Leather, & Apparel Products	0.28	0.00	0.00
Wood, Pulp & Paper, & Publishing Products	0.08	0.00	0.00
Rubber & Miscellaneous Plastic Products	1.62	0.00	0.00
Mineral Products	0.16	2.77	0.59
Machinery Products	0.33	0.08	0.00
Electronic Equipment	0.36	0.00	0.00
Miscellaneous Industrial Processes	21.21	1.39	0.00

Table 2
1990 Ozone Season Daily Emissions for the Philadelphia NAA

Source Category	Daily Emissions (tons/day) VOC	NOx	CO
SOLVENT UTILIZATION	**350.96**	**0.40**	**0.01**
Degreasing	24.95	0.00	0.00
Graphic Arts	25.97	0.00	0.00
Dry Cleaning	3.09	0.00	0.00
Surface Coating	223.90	0.40	0.01
Other Industrial	3.29	0.00	0.00
Nonindustrial	69.76	0.00	0.00
STORAGE & TRANSPORT	**90.24**	**0.04**	**0.00**
Bulk Terminals & Plants	3.59	0.00	0.00
Petroleum & Petroleum Product Storage	12.24	0.00	0.00
Petroleum & Petroleum Product Transport	31.09	0.00	0.00
Service Stations: Stage I	7.00	0.00	0.00
Service Stations: Stage II	25.47	0.00	0.00
Service Stations: Breathing & Emptying	3.12	0.00	0.00
Organic Chemical Storage	6.86	0.04	0.00
Organic Chemical Transport	0.84	0.00	0.00
Inorganic Chemical Storage	0.03	0.00	0.00
WASTE DISPOSAL & RECYCLING	**46.48**	**4.66**	**65.39**
Incineration	6.43	1.89	6.64
Open Burning	13.52	2.77	58.75
POTW	9.89	0.00	0.00
Industrial Waste Water	3.50	0.00	0.00
TSDF	12.31	0.00	0.00
Landfills	0.75	0.00	0.00
Other	0.07	0.00	0.00
HIGHWAY VEHICLES	**420.03**	**293.30**	**3,025.14**
Light-Duty Gas Vehicles & Motorcycles	329.57	190.38	2,356.33
Light-Duty Gas Trucks	67.11	38.31	474.88
Heavy-Duty Gas Vehicles	13.61	7.07	155.47
Diesels	9.74	57.55	38.46
OFF-HIGHWAY	**156.58**	**169.63**	**1,203.07**
Non-Road Gasoline	123.23	13.41	1,084.66
Non-Road Diesel	16.02	111.28	71.69
Aircraft	12.85	9.74	38.00
Marine Vessels	2.23	13.40	4.76
Railroads	2.25	21.80	3.96
MISCELLANEOUS	**6.30**	**0.59**	**24.93**
Other Combustion	4.45	0.59	24.93
Catastrophic/Accidental Releases	1.83	0.00	0.00
Health Services	0.03	0.00	0.00
TOTAL	**1,199**	**1,079**	**4,498**

Table 3
1990 Ozone Season Daily VOC Emissions for the Philadelphia NAA

Source Category	Pennsylvania Counties VOC	All Counties VOC
FUEL COMB. ELEC. UTIL.	**0.96**	**8.14**
Coal	0.17	3.93
Oil	0.45	1.12
Gas	0.01	0.28
Other	0.00	0.03
Internal Combustion	0.33	2.79
FUEL COMB. INDUSTRIAL	**0.83**	**4.30**
Coal	0.02	0.03
Oil	0.04	1.41
Gas	0.29	2.30
Other	0.00	0.02
Internal Combustion	0.48	0.54
FUEL COMB. OTHER	**1.03**	**1.93**
Commercial/Institutional Coal	0.00	0.00
Commercial/Institutional Oil	0.32	0.46
Commercial/Institutional Gas	0.65	0.75
Misc. Fuel Comb. (Except Residential)	0.05	0.06
Residential Wood	0.00	0.49
woodstoves		*0.19*
other		*0.30*
Residential Other	0.00	0.16
CHEMICAL & ALLIED PRODUCT MFG	**14.80**	**52.64**
Organic Chemical Mfg	8.78	15.99
ethylene oxide mfg		*0.01*
phenol mfg	*6.58*	*6.58*
terephthalic acid mfg	*1.38*	*1.38*
ethylene mfg		*0.35*
charcoal mfg	*0.49*	*0.49*
socmi reactor	*0.25*	*0.80*
socmi distillation		*0.09*
socmi air oxidation processes		*0.00*
socmi fugitives		*2.10*
other	*0.08*	*4.18*
Inorganic Chemical Mfg	0.13	1.64
Polymer & Resin Mfg	0.67	2.92
polypropylene mfg		*0.25*
polyethylene mfg	*0.48*	*0.59*
polystyrene resins		*0.00*
synthetic fiber		*0.35*
styrene/butadiene rubber	*0.00*	*0.49*
other	*0.19*	*1.24*

Table 3
1990 Ozone Season Daily VOC Emissions for the Philadelphia NAA (continued)

Source Category	Pennsylvania Counties VOC	All Counties VOC
CHEMICAL & ALLIED PRODUCT MFG (cont'd)		
Agricultural Chemical Mfg		0.01
Paint, Varnish, Lacquer, Enamel Mfg	1.58	1.58
paint & varnish mfg	*1.01*	*1.01*
other	*0.56*	*0.56*
Pharmaceutical Mfg	0.85	1.13
Other Chemical Mfg	2.79	29.37
printing ink mfg	*0.18*	*1.24*
fugitives unclassified		*2.28*
other	*2.61*	*25.85*
METALS PROCESSING	**0.62**	**1.69**
Nonferrous Metals Processing	0.15	0.36
Ferrous Metals Processing	0.47	1.32
Metals Processing NEC		0.02
PETROLEUM & RELATED INDUSTRIES	**21.53**	**31.51**
Petroleum Refineries & Related Industries	21.23	31.08
vaccuum distillation	*1.57*	*1.57*
cracking units	*0.00*	*0.70*
process unit turnarounds	*0.12*	*1.50*
petroleum refinery fugitives	*12.45*	*13.26*
other	*7.09*	*14.04*
Asphalt Manufacturing	0.30	0.44
OTHER INDUSTRIAL PROCESSES	**2.31**	**28.44**
Agriculture, Food, & Kindred Products	1.53	4.41
bakeries	*0.37*	*1.33*
other	*1.16*	*3.08*
Textiles, Leather, & Apparel Products		0.28
Wood, Pulp & Paper, & Publishing Products	0.07	0.08
Rubber & Miscellaneous Plastic Products	0.61	1.62
Mineral Products	0.04	0.16
Machinery Products	0.06	0.33
Electronic Equipment		0.36
Miscellaneous Industrial Processes	0.00	21.21
SOLVENT UTILIZATION	**223.41**	**350.96**
Degreasing	15.94	24.95
open top	*0.19*	*0.51*
conveyorized		*0.74*
cold cleaning	*0.89*	*1.32*
other	*14.85*	*22.39*
SOLVENT UTILIZATION (cont'd)		
Graphic Arts	20.65	25.97
letterpress	*0.19*	*0.20*
flexographic	*2.16*	*3.16*
lithographic	*0.60*	*0.93*

Table 3
1990 Ozone Season Daily VOC Emissions for the Philadelphia NAA (continued)

Source Category	Pennsylvania Counties VOC	All Counties VOC
gravure	*11.50*	*12.01*
other	*6.20*	*9.68*
Dry Cleaning	0.77	3.09
perchloroethylene		*0.74*
petroleum solvent	*0.23*	*0.48*
other	*0.53*	*1.87*
Surface Coating	147.45	223.90
industrial adhesives	*0.87*	*1.23*
fabrics	*1.89*	*2.29*
paper	*23.90*	*24.81*
large appliances	*0.11*	*0.43*
magnet wire		*0.02*
autos & light trucks	*0.38*	*7.39*
metal cans	*8.86*	*18.42*
metal coil	*1.18*	*1.18*
wood furniture	*2.86*	*4.56*
metal furniture	*7.17*	*9.65*
flatwood products	*0.46*	*1.09*
plastic parts	*0.28*	*0.51*
large ships	*0.34*	*1.13*
aircraft	*0.79*	*0.97*
misc. metal parts	*2.01*	*3.89*
steel drums		*0.02*
architectural	*30.55*	*49.28*
traffic markings	*2.55*	*5.08*
maintenance coatings	*4.09*	*6.70*
railroad	*0.07*	*0.20*
auto refinishing	*16.29*	*28.41*
machinery	*2.51*	*4.31*
electronic & other electrical	*0.31*	*0.67*
general	*2.69*	*5.89*
miscellaneous	*0.24*	*1.13*
thinning solvents	*1.10*	*1.10*
other	*35.93*	*43.52*

Table 3
1990 Ozone Season Daily VOC Emissions for the Philadelphia NAA (continued)

Source Category	Pennsylvania Counties VOC	All Counties VOC
SOLVENT UTILIZATION (cont'd)		
Other Industrial	3.16	3.29
Nonindustrial	35.45	69.76
cutback asphalt		*2.13*
other asphalt		*3.35*
pesticide application	*1.36*	*10.45*
consumer solvents		*19.74*
other	*34.09*	*34.09*
STORAGE & TRANSPORT	**46.22**	**90.24**
Bulk Terminals & Plants	0.65	3.59
fixed roof		*2.76*
floating roof	*0.22*	*0.22*
efr with seals	*0.01*	*0.01*
ifr with seals		*0.01*
underground tanks		*0.16*
other	*0.42*	*0.43*
Petroleum & Petroleum Product Storage	4.73	12.24
floating roof gasoline	*0.74*	*1.84*
floating roof crude	*0.25*	*0.25*
efr / seal gasoline	*0.03*	*3.94*
efr / seal crude	*0.11*	*0.24*
ifr / seal gasoline	*0.03*	*0.03*
other	*3.56*	*5.93*
Petroleum & Petroleum Product Transport	14.43	31.09
gasoline loading: balanced / submerged	*1.58*	*1.58*
gasoline loading: normal / submerged	*0.03*	*0.84*
marine vessel loading: gasoline & crude	*5.26*	*9.07*
other	*7.55*	*19.60*
Service Stations: Stage I	4.19	7.00
Service Stations: Stage II	19.57	25.47
Service Stations: Breathing & Emptying	1.67	3.12
Organic Chemical Storage	0.39	6.86
Organic Chemical Transport	0.59	0.84
Inorganic Chemical Storage		0.03
WASTE DISPOSAL & RECYCLING	**22.05**	**46.48**
Incineration	1.59	6.43
Open Burning	0.22	13.52
residential		*8.93*
other	*0.22*	*4.59*
POTW	7.78	9.89
Industrial Waste Water		3.50
TSDF	12.30	12.31
Landfills	0.16	0.75
Other		0.07

Table 3
1990 Ozone Season Daily VOC Emissions for the Philadelphia NAA (continued)

Source Category	Pennsylvania Counties VOC	All Counties VOC
HIGHWAY VEHICLES	**241.40**	**420.03**
Light-Duty Gas Vehicles & Motorcycles	216.24	329.57
light-duty gas vehicles	*206.36*	*317.41*
motorcycles	*9.88*	*12.16*
Light-Duty Gas Trucks	17.84	67.11
ldgt1	*10.28*	*37.93*
ldgt2	*7.56*	*29.19*
Heavy-Duty Gas Vehicles	3.71	13.61
Diesels	3.61	9.74
hddv	*1.86*	*7.58*
lddt	*0.16*	*0.23*
lddv	*1.58*	*1.94*
OFF-HIGHWAY	**88.05**	**156.58**
Non-Road Gasoline	69.88	123.23
recreational	*0.97*	*2.87*
construction	*1.79*	*2.68*
industrial	*8.14*	*10.15*
lawn & garden	*46.85*	*72.21*
farm	*0.22*	*0.49*
light commercial		*3.84*
logging		*0.29*
recreational marine vessels	*11.92*	*30.62*
other		*0.07*
Non-Road Diesel	9.83	16.02
construction	*6.59*	*10.03*
industrial	*1.48*	*1.80*
lawn & garden	*0.05*	*0.06*
farm	*1.71*	*4.09*
light commercial		*0.05*
Aircraft	7.19	12.85
Marine Vessels	0.00	2.23
diesel		*1.52*
residual oil		*0.71*
Railroads	1.15	2.25
MISCELLANEOUS	**2.31**	**6.30**
Other Combustion	2.31	4.45
structural fires	*2.29*	*3.34*
slash/prescribed burning		*0.05*
forest wildfires	*0.01*	*0.99*
cigarette smoke		*0.08*
Catastrophic/Accidental Releases		1.83
Health Services		0.03
TOTAL	**665.51**	**1,199.25**

Table 4
1990 Ozone Season Daily NO_x Emissions for the Philadelphia NAA

Source Category	Pennsylvania Counties NO_x	All Counties NO_x
FUEL COMB. ELEC. UTIL.	**74.23**	**367.43**
Coal	38.79	215.18
bituminous	*28.62*	*205.01*
anthracite & lignite	*10.17*	*10.17*
Oil	25.65	60.48
residual	*24.52*	*52.88*
distillate	*1.13*	*7.60*
Gas	5.06	17.64
natural	*2.05*	*10.27*
process	*3.00*	*7.37*
Other	0.37	9.95
Internal Combustion	4.37	64.19
FUEL COMB. INDUSTRIAL	**76.00**	**176.87**
Coal	4.78	9.55
bituminous	*4.48*	*5.86*
anthracite & lignite	*0.30*	*0.34*
other		*3.35*
Oil	10.28	23.45
residual	*5.37*	*13.95*
distillate	*0.34*	*3.10*
other	*4.56*	*6.39*
Gas	42.81	123.71
natural	*24.74*	*66.62*
process	*18.06*	*57.09*
Other	0.70	2.01
liquid waste	*0.70*	*0.84*
other		*1.17*
Internal Combustion	17.44	18.15
FUEL COMB. OTHER	**26.82**	**38.28**
Commercial/Institutional Coal	0.78	0.80
Commercial/Institutional Oil	10.86	14.15
Commercial/Institutional Gas	13.59	18.47
Misc. Fuel Comb. (Except Residential)	0.72	0.98
Residential Wood		0.05
Residential Other	0.86	3.83
distillate oil		*1.04*
natural gas		*1.67*
other	*0.86*	*1.13*
CHEMICAL & ALLIED PRODUCT MFG	**0.09**	**10.85**
Organic Chemical Mfg		0.06
Inorganic Chemical Mfg	0.08	0.28
Polymer & Resin Mfg	0.01	0.02
Agricultural Chemical Mfg		0.00
Paint, Varnish, Lacquer, Enamel Mfg		0.02
Other Chemical Mfg		10.47

Table 4
1990 Ozone Season Daily NO_x Emissions for the Philadelphia NAA (continued)

Source Category	Pennsylvania Counties NO_x	All Counties NO_x
METALS PROCESSING	**1.47**	**1.60**
Nonferrous Metals Processing	0.00	0.00
Ferrous Metals Processing	1.46	1.46
Metals Processing NEC		0.13
PETROLEUM & RELATED INDUSTRIES	**9.95**	**10.84**
Petroleum Refineries & Related Industries	9.79	10.52
Asphalt Manufacturing	0.16	0.32
OTHER INDUSTRIAL PROCESSES	**2.79**	**4.25**
Agriculture, Food, & Kindred Products	0.02	0.02
Mineral Products	2.77	2.77
glass mfg	*1.75*	*1.75*
other	*1.02*	*1.02*
Machinery Products	0.00	0.08
Miscellaneous Industrial Processes		1.39
SOLVENT UTILIZATION	**0.03**	**0.40**
Surface Coating	0.03	0.40
Other Industrial	0.00	0.00
STORAGE & TRANSPORT	**0.00**	**0.04**
Organic Chemical Storage		0.04
WASTE DISPOSAL & RECYCLING	**1.69**	**4.66**
Incineration	1.63	1.89
Open Burning	0.06	2.77
HIGHWAY VEHICLES	**146.32**	**293.30**
Light-Duty Gas Vehicles & Motorcycles	117.11	190.38
light-duty gas vehicles	*116.39*	*189.43*
motorcycles	*0.72*	*0.94*
Light-Duty Gas Trucks	10.03	38.31
ldgt1	*5.85*	*22.99*
ldgt2	*4.18*	*15.32*
Heavy-Duty Gas Vehicles	1.93	7.07
Diesels	17.26	57.55
hddv	*12.55*	*51.77*
lddt	*0.40*	*0.54*
lddv	*4.31*	*5.23*
OFF-HIGHWAY	**99.82**	**169.63**
Non-Road Gasoline	9.36	13.41
recreational	*3.50*	*3.50*
construction	*0.17*	*0.20*
industrial	*4.14*	*6.06*
lawn & garden	*0.49*	*0.70*
farm	*0.02*	*0.03*
light commercial		*0.05*
logging		*0.00*
recreational marine vessels	*1.04*	*2.46*
other		*0.41*

Table 4
1990 Ozone Season Daily NO_x Emissions for the Philadelphia NAA (continued)

Source Category	Pennsylvania Counties NO_x	All Counties NO_x
Non-Road Diesel	66.72	111.28
recreational		
construction	*53.13*	*81.90*
industrial	*6.37*	*9.41*
lawn & garden	*0.35*	*0.53*
farm	*6.87*	*19.01*
light commercial		*0.43*
Aircraft	8.16	9.74
Marine Vessels	0.00	13.40
diesel		*9.17*
residual oil		*4.23*
Railroads	15.57	21.80
MISCELLANEOUS	**0.29**	**0.59**
Other Combustion	0.29	0.59
TOTAL	**439.50**	**1,078.75**

Table 5
1990 Ozone Season Daily CO Emissions for the Philadelphia NAA

Source Category	Pennsylvania Counties CO	All Counties CO
FUEL COMB. ELEC. UTIL.	**6.06**	**28.25**
Coal	1.48	10.91
Oil	3.10	6.33
Gas	0.39	1.35
Other	0.01	0.28
Internal Combustion	1.07	9.38
FUEL COMB. INDUSTRIAL	**9.31**	**37.57**
Coal	0.14	0.43
Oil	0.88	2.30
Gas	5.21	31.42
Other	0.02	0.20
Internal Combustion	3.07	3.21
FUEL COMB. OTHER	**5.78**	**12.25**
Commercial/Institutional Coal	0.03	0.03
Commercial/Institutional Oil	2.59	3.08
Commercial/Institutional Gas	2.70	3.74
Misc. Fuel Comb. (Except Residential)	0.16	0.19
Residential Wood	0.00	4.08
woodstoves		*1.59*
other		*2.49*
Residential Other	0.31	1.14
CHEMICAL & ALLIED PRODUCT MFG	**0.02**	**30.45**
Organic Chemical Mfg		2.54
Inorganic Chemical Mfg	0.00	27.47
pigments; TiO2 chloride process: reactor		*27.47*
Inorganic Chemical Mfg	0.02	0.05
Polymer & Resin Mfg		0.00
Pharmaceutical Mfg		0.13
Other Chemical Mfg		0.26
METALS PROCESSING	**35.96**	**35.97**
Ferrous Metals Processing	35.96	35.96
gray iron cupola	*12.69*	*12.69*
other	*23.27*	*23.27*
Metals Processing NEC		0.01
PETROLEUM & RELATED INDUSTRIES	**17.87**	**34.28**
Petroleum Refineries & Related Industries	17.71	33.98
fcc units	*16.73*	*32.99*
other	*0.98*	*0.98*
Asphalt Manufacturing	0.16	0.30
OTHER INDUSTRIAL PROCESSES	**0.58**	**0.59**
Agriculture, Food, & Kindred Products		0.00
Mineral Products	0.58	0.59
Miscellaneous Industrial Processes		0.00

Table 5
1990 Ozone Season Daily CO Emissions for the Philadelphia NAA (continued)

Source Category	Pennsylvania Counties CO	All Counties CO
SOLVENT UTILIZATION	**0.01**	**0.01**
Graphic Arts	0.00	0.00
Surface Coating	0.01	0.01
Other Industrial	0.00	0.00
WASTE DISPOSAL & RECYCLING	**6.52**	**65.39**
Incineration	5.29	6.64
industrial	*0.01*	*0.49*
commmercial/institutional	*0.05*	*0.87*
other	*5.23*	*5.28*
Open Burning	1.24	58.75
residential		*25.30*
other	*1.24*	*33.46*
HIGHWAY VEHICLES	**1,763.97**	**3,025.14**
Light-Duty Gas Vehicles & Motorcycles	1,575.65	2,356.33
light-duty gas vehicles	*1,555.84*	*2,331.10*
motorcycles	*19.81*	*25.23*
Light-Duty Gas Trucks	133.09	474.88
ldgt1	*79.29*	*278.39*
ldgt2	*53.81*	*196.49*
Heavy-Duty Gas Vehicles	43.32	155.47
Diesels	11.90	38.46
hddv	*7.94*	*33.58*
lddt	*0.29*	*0.42*
lddv	*3.67*	*4.47*
OFF-HIGHWAY	**748.24**	**1,203.07**
Non-Road Gasoline	674.08	1,084.66
recreational		*6.59*
construction	*21.34*	*32.33*
industrial	*170.88*	*202.12*
lawn & garden	*428.12*	*652.71*
farm	*2.16*	*5.13*
light commercial		*63.32*
logging		*0.83*
recreational marine vessels	*51.58*	*121.53*
other		*0.09*
Non-Road Diesel	44.78	71.69
recreational		
construction	*30.72*	*46.66*
industrial	*7.18*	*8.47*
lawn & garden	*0.21*	*0.33*
farm	*6.67*	*15.98*
light commercial		*0.25*

Table 5
1990 Ozone Season Daily CO Emissions for the Philadelphia NAA (continued)

Source Category	Pennsylvania Counties CO	All Counties CO
OFF-HIGHWAY (cont'd)		
Aircraft	27.11	38.00
Marine Vessels	0.00	4.76
diesel		*3.42*
residual oil		*1.34*
Railroads	2.28	3.96
MISCELLANEOUS	**12.58**	**24.93**
Other Combustion	12.58	24.93
structural fires	*12.50*	*18.20*
slash/prescribed burning		*0.74*
forest wildfires	*0.08*	*5.78*
cigarette smoke		*0.21*
TOTAL	**2,606.91**	**4,497.90**

Table 6
Baltimore NAA 1990 Ozone Season Daily Emissions from the OTAG Inventory (tons/day)

SOURCE CATEGORY	VOC	NOx	CO
FUEL COMB. ELEC. UTIL.	**0.95**	**205.26**	**9.45**
Coal	0.55	157.19	4.95
Oil	0.29	29.59	2.13
Gas	0.07	11.59	0.65
Internal Combustion	0.03	6.90	1.73
FUEL COMB. INDUSTRIAL	**4.67**	**21.95**	**4.34**
Coal	0.03	4.83	1.72
Oil	4.09	5.56	0.81
Gas	0.27	4.57	0.90
Other		0.00	0.00
Internal Combustion	0.28	6.98	0.90
FUEL COMB. OTHER	**0.37**	**9.44**	**2.13**
Commercial/Institutional Coal		0.01	0.00
Commercial/Institutional Oil	0.16	6.06	1.09
Commercial/Institutional Gas	0.06	0.95	0.21
Misc. Fuel Comb. (Except Residential)	0.00	0.02	0.00
Residential Other	0.15	2.41	0.82
CHEMICAL & ALLIED PRODUCT MFG	**3.07**	**1.43**	**30.12**
Organic Chemicals	2.01	0.32	0.03
Inorganic Chemicals	0.01	0.39	30.07
Polymers & Resins	0.21		
Agricultural Chemicals	0.17	0.01	0.00
Paints, Varnishs, Lacquers, Enamels	0.63	0.01	0.00
Other Chemicals	0.05	0.70	0.03
METALS PROCESSING	**1.72**	**15.15**	**332.44**
Nonferrous Metals Processing	0.17	0.14	0.03
Ferrous Metals Processing	1.54	14.97	332.40
Metals Processing NEC	0.00	0.05	0.01
PETROLEUM & RELATED INDUSTRIES	**0.32**	**0.34**	**1.36**
Petroleum Refineries & Related Industries	0.03	0.04	0.73
Asphalt Manufacturing	0.29	0.30	0.63
OTHER INDUSTRIAL PROCESSES	**5.35**	**9.24**	**1.33**
Agriculture, Food, & Kindred Products	3.21	0.20	0.05
Textiles, Leather, & Apparel Products	0.03	0.03	0.01
Wood, Pulp & Paper, & Publishing Products	0.31	0.00	
Rubber & Miscellaneous Plastic Products	0.90	0.00	
Mineral Products	0.08	9.00	1.27
Machinery Products	0.59	0.01	
Miscellaneous Industrial Processes	0.23		
SOLVENT UTILIZATION	**118.12**	**0.36**	**0.07**
Degreasing	10.89	0.00	0.00
Graphic Arts	10.52	0.04	0.01
Dry Cleaning	6.08	0.00	
Surface Coating	63.84	0.32	0.07
Other Industrial	0.03		
Nonindustrial	26.75		

Table 6
Baltimore NAA 1990 Ozone Season Daily Emissions from the OTAG Inventory (tons/day) (continued)

SOURCE CATEGORY	VOC	NOx	CO
STORAGE & TRANSPORT	**26.78**	**0.52**	**0.20**
Bulk Terminals & Plants	8.10		
Petroleum & Petroleum Product Storage	2.75	0.02	0.03
Petroleum & Petroleum Product Transport	0.36		
Service Stations: Stage I	14.12		
Service Stations: Stage II	0.02		
Service Stations: Breathing & Emptying	1.05		
Organic Chemical Storage	0.18		
Organic Chemical Transport	0.00		
Inorganic Chemical Storage	0.01	0.30	0.12
Bulk Materials Storage	0.20	0.20	0.05
WASTE DISPOSAL & RECYCLING	**12.51**	**6.62**	**30.33**
Incineration	0.23	5.83	3.47
Open Burning	3.64	0.77	26.86
POTW	2.74	0.00	
Industrial Waste Water	0.02		
Landfills	2.52	0.02	
Other	3.36		
HIGHWAY VEHICLES	**145.62**	**131.21**	**1194.57**
Light-Duty Gas Vehicles & Motorcycles	102.31	69.89	824.17
Light-Duty Gas Trucks	31.25	21.79	261.05
Heavy-Duty Gas Vehicles	7.20	5.02	86.73
Diesels	4.86	34.51	22.62
OFF-HIGHWAY	**59.79**	**71.42**	**441.63**
Non-Road Gasoline	48.32	3.89	392.15
Non-Road Diesel	6.96	52.85	29.74
Aircraft	3.78	2.47	17.77
Marine Vessels	0.27	1.54	0.62
Railroads	0.46	10.67	1.35
MISCELLANEOUS	**0.07**	**0.02**	**0.34**
Other Combustion	0.07	0.02	0.34
TOTAL	**379.34**	**472.97**	**2048.30**

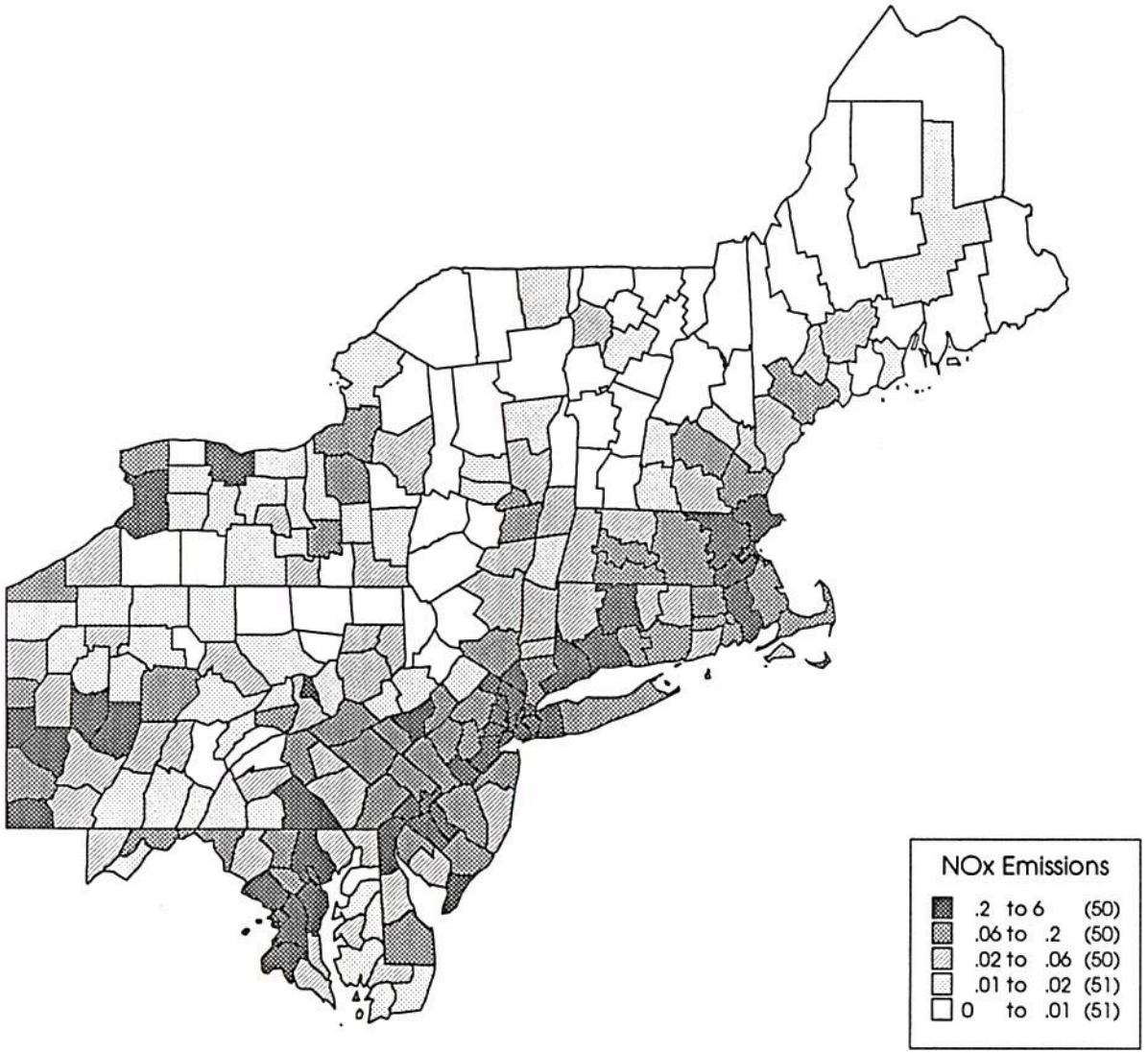
Table 7
Ozone Transport Commission
State VOC Emissions

State	VOC Emissions (tons/day)
Connecticut	693
Delaware	199
District of Columbia	63
Maine	332
Maryland	843
Massachusetts	1,048
New Hampshire	226
New Jersey	1,454
New York	2,752
Pennsylvania	2,137
Rhode Island	200
Vermont	110

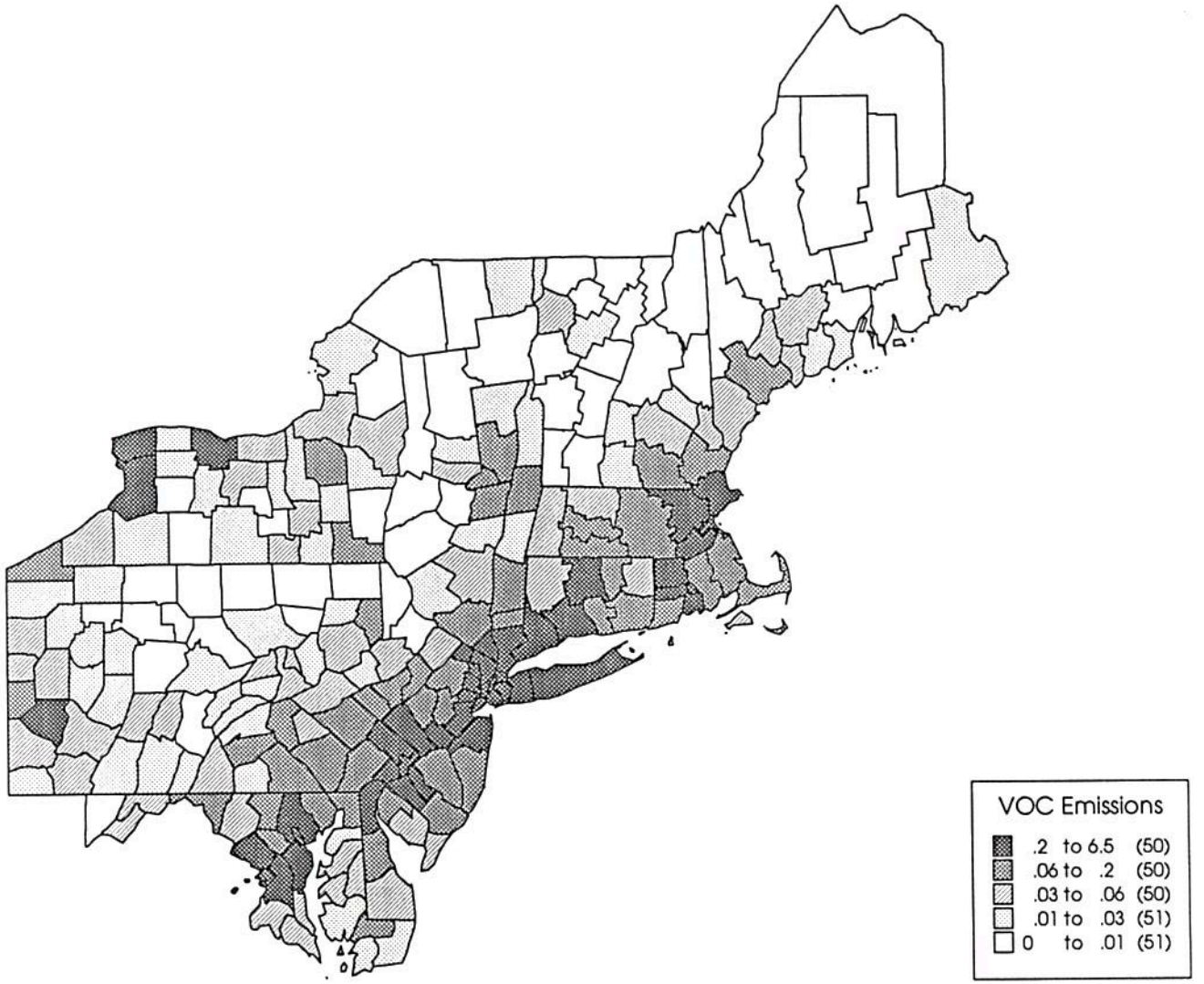
Table 8
Ozone Transport Commission
State NOx Emissions

State	NOx Emissions (tons/day)
Connecticut	462
Delaware	257
District of Columbia	51
Maine	266
Maryland	1,076
Massachusetts	928
New Hampshire	241
New Jersey	1,521
New York	2,113
Pennsylvania	3,089
Rhode Island	101
Vermont	78

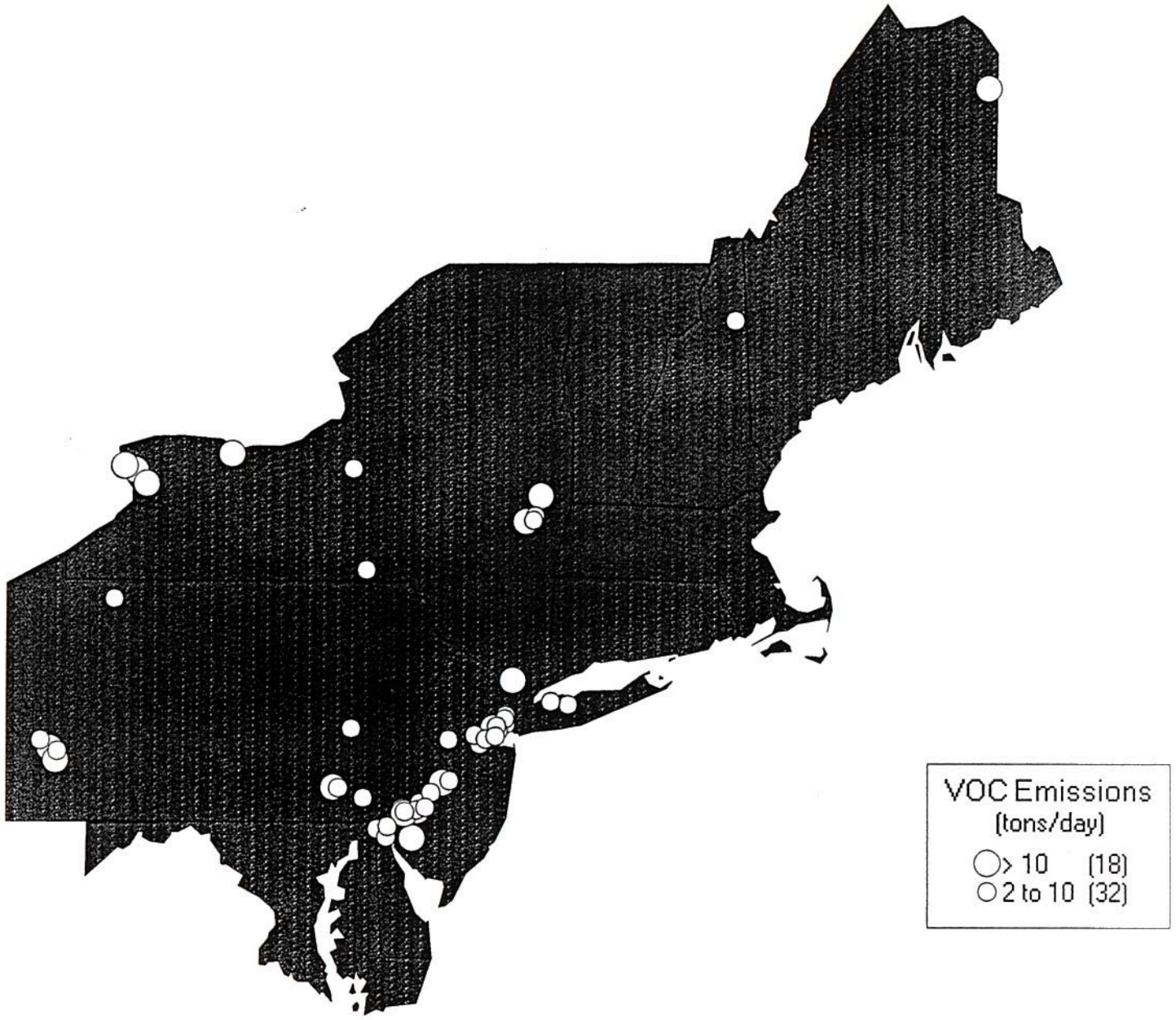
OZONE TRANSPORT COMMISSION 1990 NOx EMISSIONS
(tons/summer day/square mile)



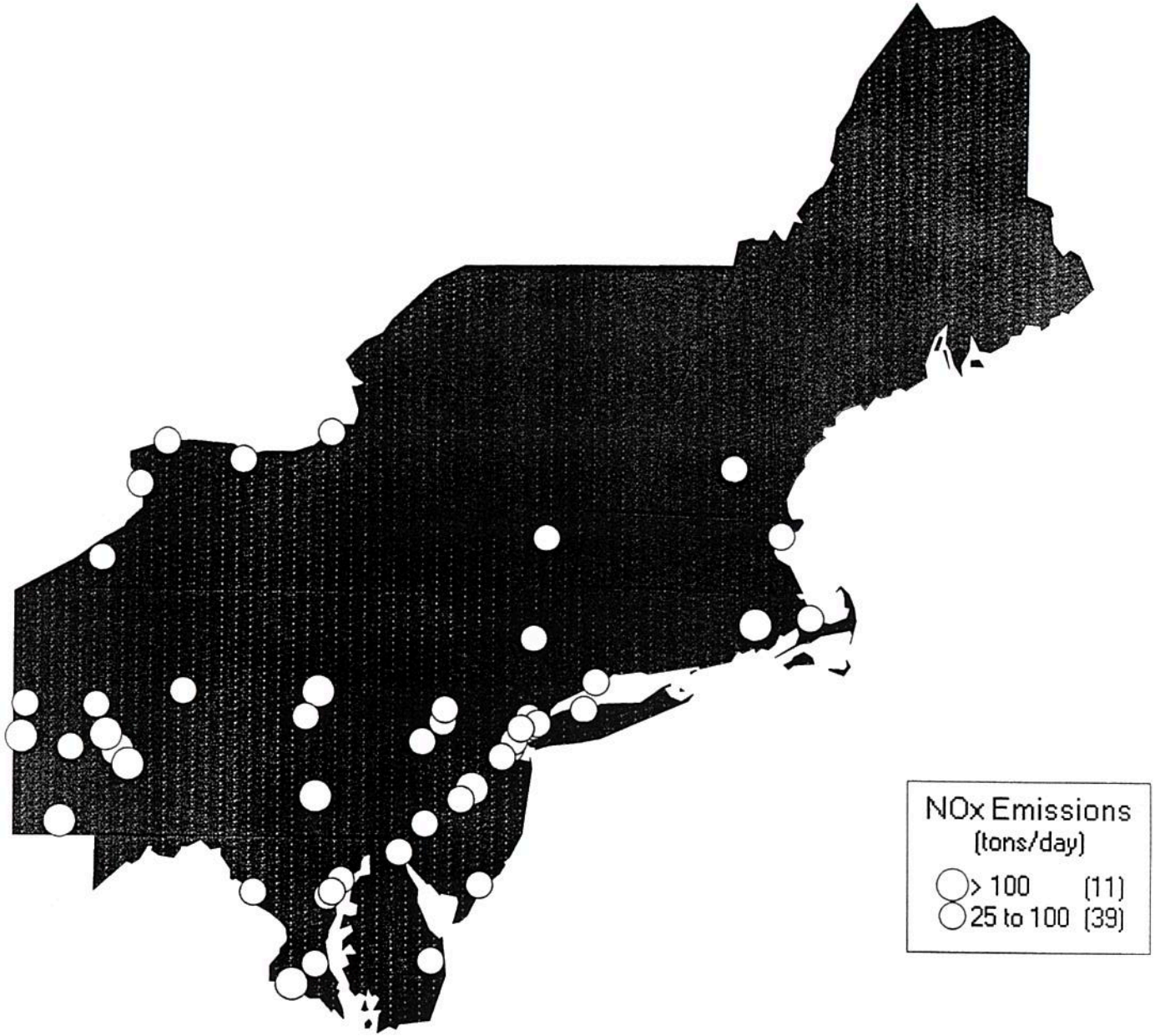
OZONE TRANSPORT COMMISSION 1990 VOC EMISSIONS
(tons/summer day/square mile)



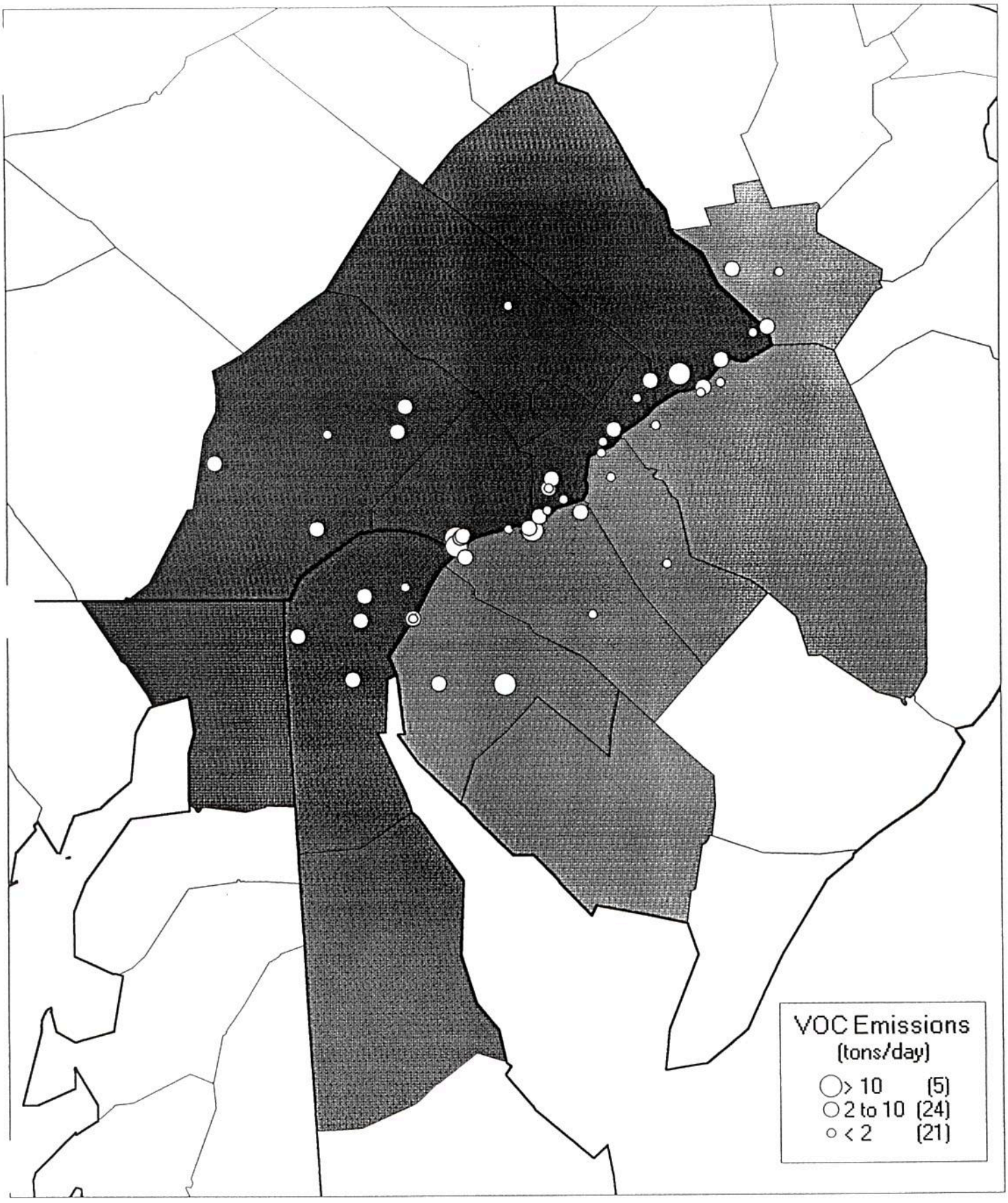
Top 50 VOLATILE ORGANIC CO..POUND Emitters in the OTR Reg..



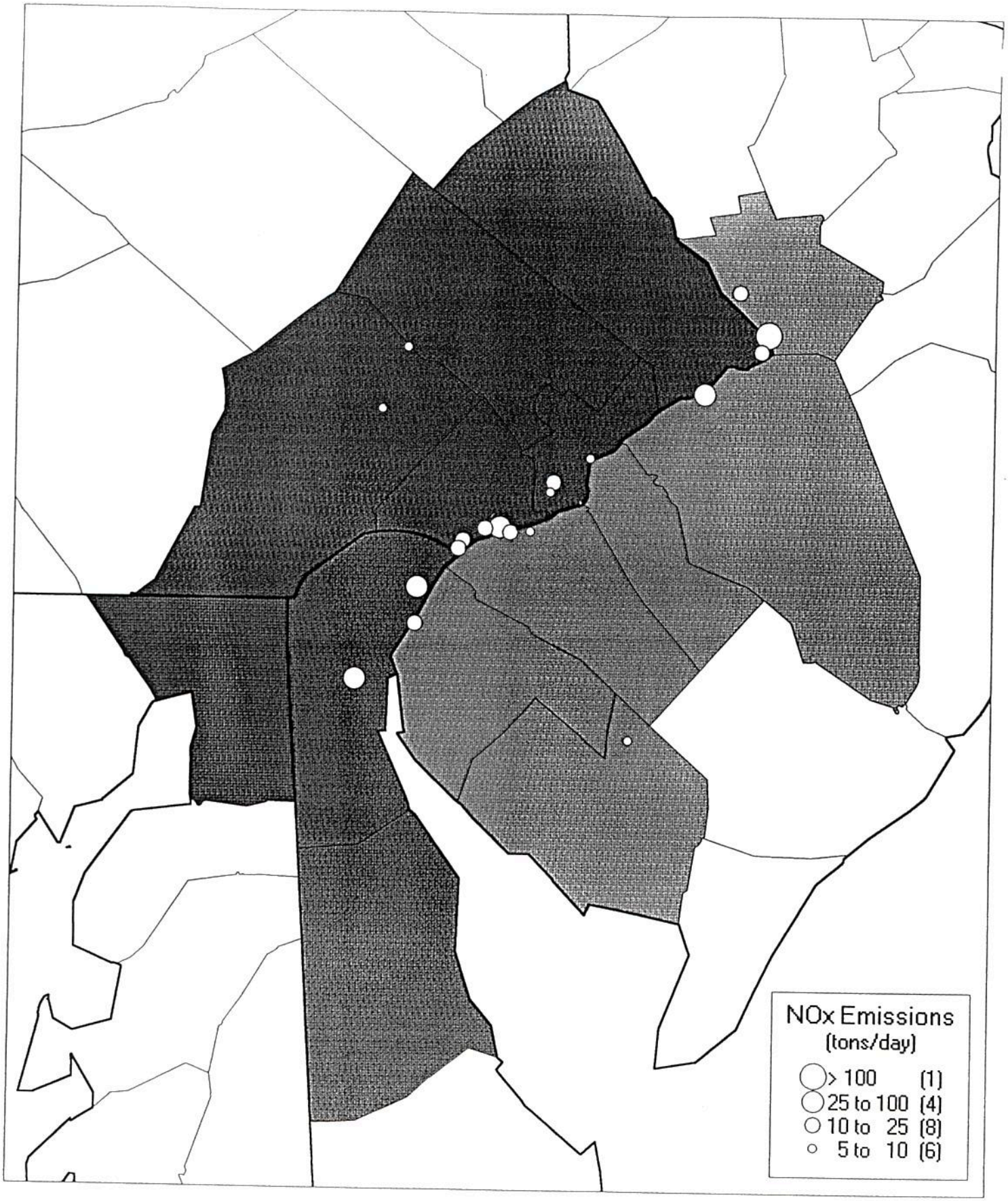
Top 50 OXIDES OF NITROGEN Emitters in the OTR Region



TOP 50 VOLATILE ORGANIC COMPOUND Emitters in the Philadelphia NAA



TOP 19 OXIDES OF NITROGEN Emitters in the Philadelphia NAA



TOP 20 VOLATILE ORGANIC COMPOUND Emitters in the Pennsylvania Counties of the Philadelphia NAA

TOP 10 OXIDES OF NITROGEN Emitters in the Pennsylvania Counties of the Philadelphia NAA

Five Pennsylvania County Portion of Philadelphia-Wilmington-Trenton Area VOC Emissions - tons per day

	1990	1996	2005
Point Sources	155.7	136.9	151.7
Area Sources	204.8	183.8	196.6
Nonroad Engines/Vehicles	80.6	81.3	84.8
Highway Vehicles	188.2	103.0	54.4
Total	**629.3**	**505.0**	**487.5**

Emission Reduction Summary

	VOC Reductions (tons per day)	
Point Sources	**1996**	**2005**
Control Effectiveness Improvements	21.6	24.6
RACT Fix-up	0.8	1.9
Facility Shutdowns	3.2	3.9
Total	**25.6**	**30.4**

Emission Reduction Summary

	VOC Reductions (tons per day)	
Area Sources	**1996**	**2005**
AIM Coatings	6.0	6.3
Service Stations (Stage II)	17.0	18.6
Hazardous Waste TSDFs	3.1	3.1
Autobody Refinishing	6.8	6.2
Consumer Solvents		7.0
Traffic Line Paints		1.6
Total	**32.9**	**42.9**

Emission Reduction Summary
Highway Vehicles

	1996	2005
Creditable		
Tier 1 Emission Standards	4.5	7.7
High Enhanced I/M	45.6	81.4
Reformulated Gasoline	23.1	38.0
	73.2	128.0
Non-Creditable		
Gasoline Volatility/FMVCP	33.0	45.8

Emission Reduction Summary
Nonroad Engines

	1996	2005
Reformulated Gasoline Use	0.6	0.6

Five Pennsylvania County Portion of Philadelphia-Wilmington-Trenton Area NO_x Emissions - tons per day

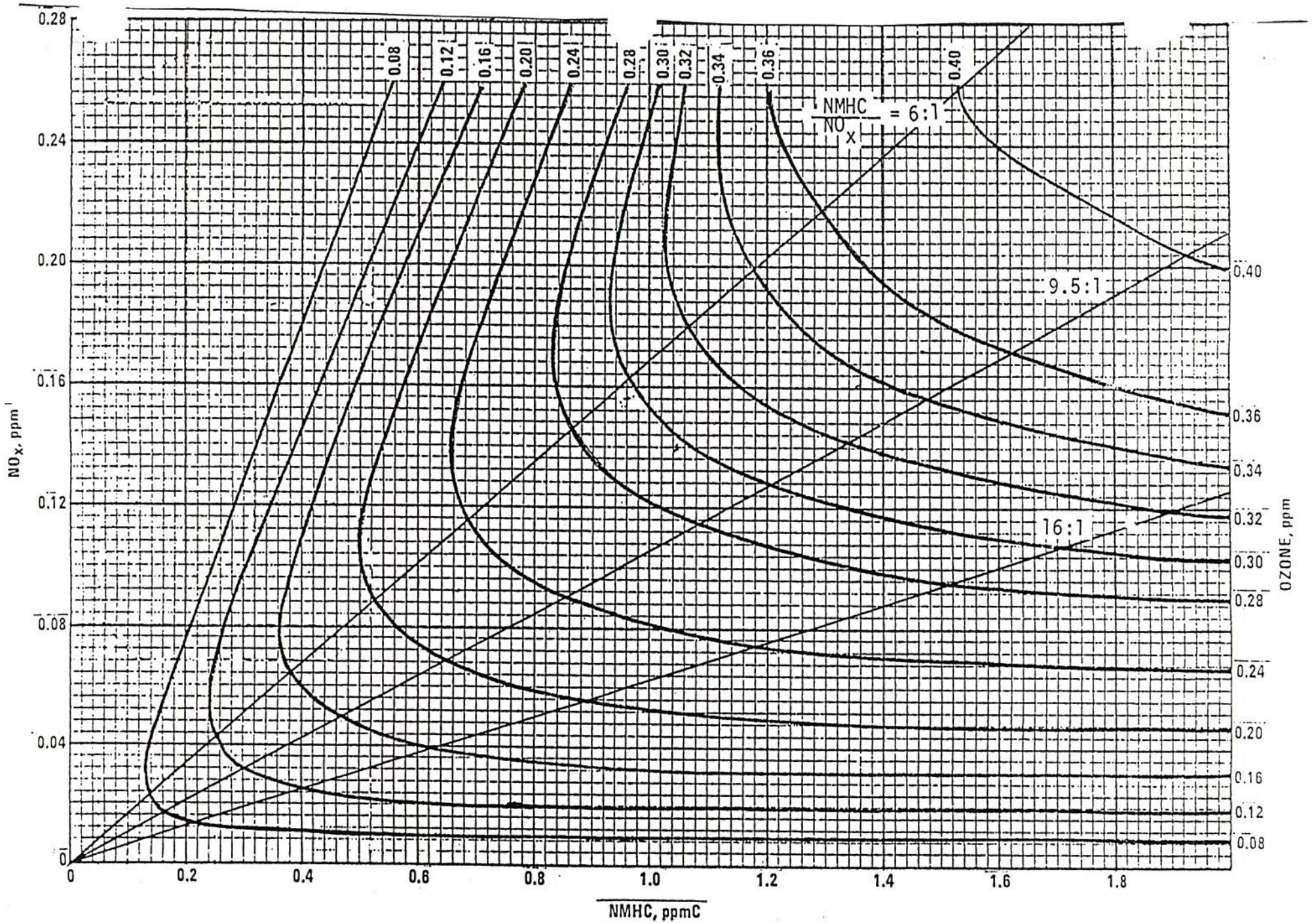
	1990	1996	2005
Point Sources	170.0	100.0	99.0
Area Sources	23.4	25.4	28.5
Nonroad Engines/Vehicles	99.8	103.6	109.3
Highway Vehicles	158.3	134.5	105.8
Total	**451.5**	**363.5**	**342.6**

Emissions-Based VOC/NO_x Ratios

	VOC (tons per day)	NO_x (tons per day)	VOC/NO_x Ratio
Man-Made			
Entire NA Area	1,199	1,079	1.11 * 46/16 = 3.19 pppc/ppm
5 PA Counties	666	440	1.51 * 46/16 = 4.40
Philadelphia County	189	125	1.51 * 46/16 = 4.34
With Biogenics			
5 PA Counties	777	445	1.75 * 46/16 = 5.0

Median $NMOC/NO_x$ Ratios Determined for 1985 (ppm)

	$NMOC/NO_x$	Samples
Philadelphia 1	6.8	60
Philadelphia 2	9.5	55


0.28
0.24
0.20
0.16
0.12
0.08
0.04
0
NO_X, ppm
0.08
0.12
0.16
0.20
0.24
0.28
0.30
0.32
0.34
0.36
0.40
$\frac{NMHC}{NO_X}$ = 6:1
9.5:1
16:1
0.40
0.36
0.34
0.32
0.30
0.28
0.24
0.20
0.16
0.12
0.08
OZONE, ppm
0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
NMHC, ppmC

- At higher VOC/NOx ratios (greater than 8-10), ozone concentrations are relatively insensitive to VOC concentrations, and NOx control is more effective in reducing ozone.
- At VOC/NOx ratios less than 8-10, lowering VOC reduces ozone, and NOx control might increase ozone at some urban locations.

Ozone Precursor Pollutants Affected by the 1990 Clean Air Act Amendments

Title	Pollutants Affected
Title I - Nonattainment	VOC, NO_x, CO
Title II - Mobile Sources	VOC, NO_x, CO
Title III - Air Toxics	VOC
Title IV - Acid Rain	NO_x (utility only)

Title I - Nonattainment

- National Measures
  - Hazardous Waste TSDFs
  - Municipal Landfills
  - Marine Vessel Loading
  - Consumer and Commercial Products
  - Architectural (AIM) Coatings

Title II - Motor Vehicles

- New Federal Evaporative Test Procedure
- Tier I Exhaust Standards
- On-board Vapor Recovery
- Cold Temperature CO Standard
- Onboard Diagnostics
- Non-road Vehicles/Engines

Title III - NESHAPs

- MACT Standards by Source Category Group
- 2, 4, 7, and 10 Year Standards
- Existing Sources must Comply within 3 Years of Issuance

Example: Petroleum Refinery MACT Standards

- Promulgation Schedule
  - 4-year standard (due by November 15, 1994)
    - other sources not distinctly listed:
      - miscellaneous process vents
      - storage vessels
      - wastewater collection and treatment systems
      - equipment leaks
  - 7-year standard (due by November 15, 1997)
    - catalytic cracking (fluid and other) units
    - catalytic reforming units
    - sulfur plants units

Petroleum Refinery MACT Standard (4-year standard)

- Final rule issued August 15, 1995
- CAA requires that standards be at least as stringent as the MACT floor:
  - the average emission limitation achieved by the best performing 12 percent of existing sources.

Petroleum Refinery MACT Standard Requirements

- "Emissions averaging" provision allows facilities flexibility in determining which emission sources to control.
- 4-year standard will reduce HAP emissions from petroleum refineries by 59 percent by 1998.

Title IV - Acid Rain

- NOx Limits by Boiler Type
- Low NOx Burners

Area-Specific Controls Applicable in 2005 or Earlier

Ozone Nonattainment Areas				
Marginal	**Moderate**	**Serious**	**Severe**	**NE Transport Region***
RACT to 100 tpy (VOC and NO_x)	RACT to 100 tpy (VOC and NO_x)	RACT to 50 tpy (VOC and NO_x)	RACT to 25 tpy (VOC and NO_x)	RACT to 50 tpy (VOC) and 100 tpy (NO_x)
	15% reduction by 1996	3% per year RFP	3% per year RFP	
	New CTGs	New CTGs	New CTGs	New CTGs
				Add Existing CTGs (already required in nonattainment areas)
	Basic I/M	Enhanced I/M	Enhanced I/M	OTR Low Enhanced I/M (population of 100,000 or more)
		Fleet Clean Fuels (population of 250,000 or more)	Fleet Clean Fuels (population of 250,000 or more)	
			Phase II reform - nine most severe areas	
		Stage II	Stage II	Stage II Comparability
NSR and offsets for new major stationary sources	NSR and offsets for new major stationary sources	NSR and offsets for new major stationary sources	NSR and offsets for new major stationary sources	NSR and offsets for new major stationary sources

Ozone Transport Assessment Group
VOC Control Scenarios

Scenario	Major Point Sources	Other Point/Area	Non-road Mobile	Highway Vehicle
Base I (Mandated Clean Air Act Controls)	• CTG and Non-CTG RACT at major sources in NAAs and in OTR • New Source LAER and Offsets for NAAs • Title III MACT • Other 15% Measures	• Commercial/Consumer Solvents (two phases) & AIM Coatings (one phase) • Stage I & II Petroleum Distribution Controls - all NAAs • Autobody, Degreasing, & Dry Cleaning Controls - all NAAs • On-Board Vapor Recovery • Title III MACT • TSDFs, Landfills, Benzene NESHAP • Other 15% Measures	• Fed Phase II Small Eng. Stds. • Fed Marine Engine Stds • Fed HDV (>= 50 hp) Stds. Ph. 1 • Fed RFG II[4] • Fed RVP gas elsewhere in OTAG region • Other 15% Measures	• Tier I LDV and HDV Standards • Fed RFG II[?] • Fed RVP gas elsewhere in OTAG region • Enhanced I/M[3] • Low Enhanced I/M - rest of OTR • Basic I/M in mandated areas • Clean Fuel Fleets in mandated areas • Other 15% Measures
Base 2 (Partial Phase I)	Base 1, plus: • Other "9% by 99" ROP Measures[3]	Base 1 plus: • Other "9% by 99" ROP Measures[3]	Base 1, plus: • Fed Locomotive Standards (not including rebuilds) • Other "9% by 99" ROP Measures[3]	Base 1, plus: • National LEV with ATV in OTR • HDV 3 gm std • FTP revisions • Other "9% by 99" ROP Measures[3]
Base 3 (Full Phase I)	Base 1, plus: • Other "9% by 99" ROP Measures[3], except Lake Michigan, where full "33% by 07" ROP applies	Base 1, plus: • Other "9% by 99" ROP Measures[3], except Lake Michigan, where full "33% by 07" ROP applies	Base 1, plus: • Other "9% by 99" ROP Measures[3], except Lake Michigan, where full "33% by 07" ROP applies	Base 1, plus: • OTC LEV • HDV 3 gm std • FTP revisions • Other "9% by 99" ROP Measures[3], except Lake Michigan, where full "33% by 07" ROP applies
Kitchen Sink - Level 3	(To be determined)	(To be determined)	Base 1, plus: • Fed Locomotive Standards (including rebuilds)[1] • Cal RFG II[2 6] (replaces Fed RFG II) • Low RVP fuel (6.7 psi) in non-RFG areas • CARB Tier II small engine std	Base 1, plus: • Maximum I/M for LDV (LEV-specific cutpoints) for all weight classes[?] • HDV I/M[?] • Cal RFP II[2 6] (replaces Fed RFG II) • Low RVP fuel (6.7 psi) in non-RFG areas

NOTES: [1]National.
[2]OTAG Wide or Specified.
[3]Serious and above areas.
[4]Statutory and opt in areas.
[5]Currently evaluating OTAG-optimized fuel (e.g., low RVP, low sulfur, low olefins) elsewhere in OTAG regions, as alternative.
[6]For all NAAs and all MSA/CMSAs $\geq$ 100,000.

Ozone Transport Assessment Group
NO_x Control Scenarios

Scenario	Utilities	Other Point/Area	Non-road Mobile	Highway Vehicle
Base I (Mandated Clean Air Act Controls)	• Title IV (Phase 1, 2 - all boiler types) • 250 Ton PSD and NSPS • RACT & NSR in non-waived NAAs	• RACT at major sources in non-waived NAAs and in OTR • NSR in non-waived NAAs • 250 ton PSD and NSPS	• Fed Phase II Small Eng. Stds • Fed Marine Engine Stds • Fed HDV (> = 50 hp) Stds. - Ph. 1 • Fed RFG II[7]	• Tier I LDV and HDV Standards • Fed RFG II[7] • Enhanced I/M[3] • Low Enhanced I/M - rest of OTR • Basic I/M in mandated areas • Clean Fuel Fleets in mandated areas
Base 2 (Partial Phase I)	Base 1, plus: • OTC NO_x MOU (Phase II) • Other "9% by 99" ROP Measures[3]	Base 1, plus: • Other "9% by 99" ROP Measures[3]	Base 1, plus: • Fed Locomotive Standards (not including rebuilds) • Other "9% by 99" ROP Measures[3]	Base 1, plus: • National LEV with ATV in OTR • HDV 3 gm std • FTP revisions • Other "9% by 99" ROP Measures[3]
Base 3 (Full Phase I)	Base 1, plus: • OTC NO_x MOU (Phase III) • Other "9% by 99" ROP Measures[3]	Base 1, plus: • Other "9% by 99" ROP Measures[3]	Base 1, plus: • Other "9% by 99" ROP Measures[3]	Base 1, plus: • OTC LEV • Other "9% by 99" ROP Measures[3]
Kitchen Sink - Level 3	• 85% reduction from 1990 levels	(To be determined)	Base 1, plus: • Fed Locomotive Standards (including rebuilds)[1] • Cal RFG II[2 6] (replaces Fed RFG II) • Reformulated Diesel (55 octane)[2] • HD engine 4 gm standard	Base 1, plus: • Maximum I/M for LDV (LEV-specific cutpoints) for all weight classes[7] • HDV I/M[7] • Cal RFG II[2 6] (replaces Fed RFG II) • Reformulated Diesel (55 octane)[2] • HDV 2 gm standard

NOTES: [1]National.
[2]OTAG Wide or Specified.
[3]Serious and above areas.
[4]Statutory and opt in areas.
[5]Currently evaluating OTAG-optimized fuel (e.g., low RVP, low sulfur, low olefins) elsewhere in OTAG regions, as alternative.
[6]For all NAAs and all MSA/CMSAs $\geq$ 100,000.

Summary of VOC Emission Reduction Measures in the 15% Plan for the PA Portion of the Philadelphia CMSA

SIP Measures	tpsd	percent of total
AIM	5.96	5%
Stage II	17.02	13%
TSDF	3.13	2%
Autobody Refinishing	6.79	5%
RE 80-90%	21.55	17%
RACT fix-ups	0.84	1%
Tier 1/FMVCP	4.51	3%
E/IM	45.64	35%
Reform	23.06	18%
Nonroad Reform	0.59	0%
Total Reductions:	**129.09**	
Contingency Measures		
RE 90-94%	8.63	0.38
RACT	1.02	0.04
Consumer Products	6.68	0.29
ETR	0.93	0.04
Shutdowns	3.96	0.17
Traffic Line Paint	1.57	0.07
Total Contingency Measures:	**22.79**	

Summary of VOC and NOx Emission Reduction Measures in the RFP Plan for the PA Portion of the Philadelphia CMSA

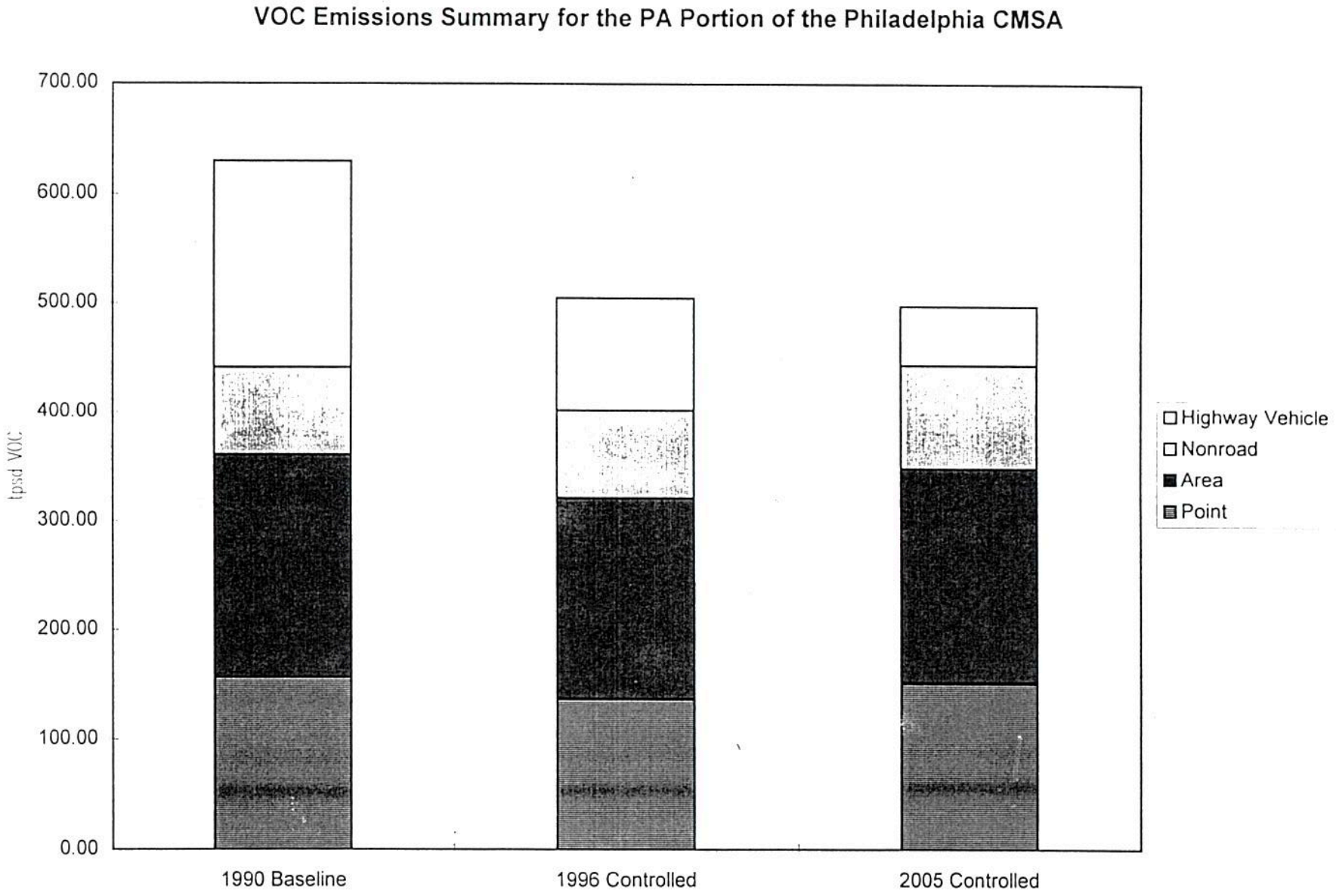
SIP Measures (VOC)	tpsd	percent of total
AIM (15%)	6.35	3%
Stage II (80%RE)	18.64	9%
TSDF	3.13	2%
Autobody Refinishing	6.22	3%
RE 80-90%	17.57	9%
RACT fix	0.84	0%
Tier 1	7.68	4%
E/IM	81.38	40%
Reform	37.95	19%
Nonroad Reform	0.59	0%
RE 90-94%	7.04	3%
RACT	1.86	1%
Consumer Products	6.97	3%
ETR	1.00	0%
Shutdowns	3.88	2%
Traffic Line Paint	1.57	1%
Total VOC Reductions:	**202.68**	

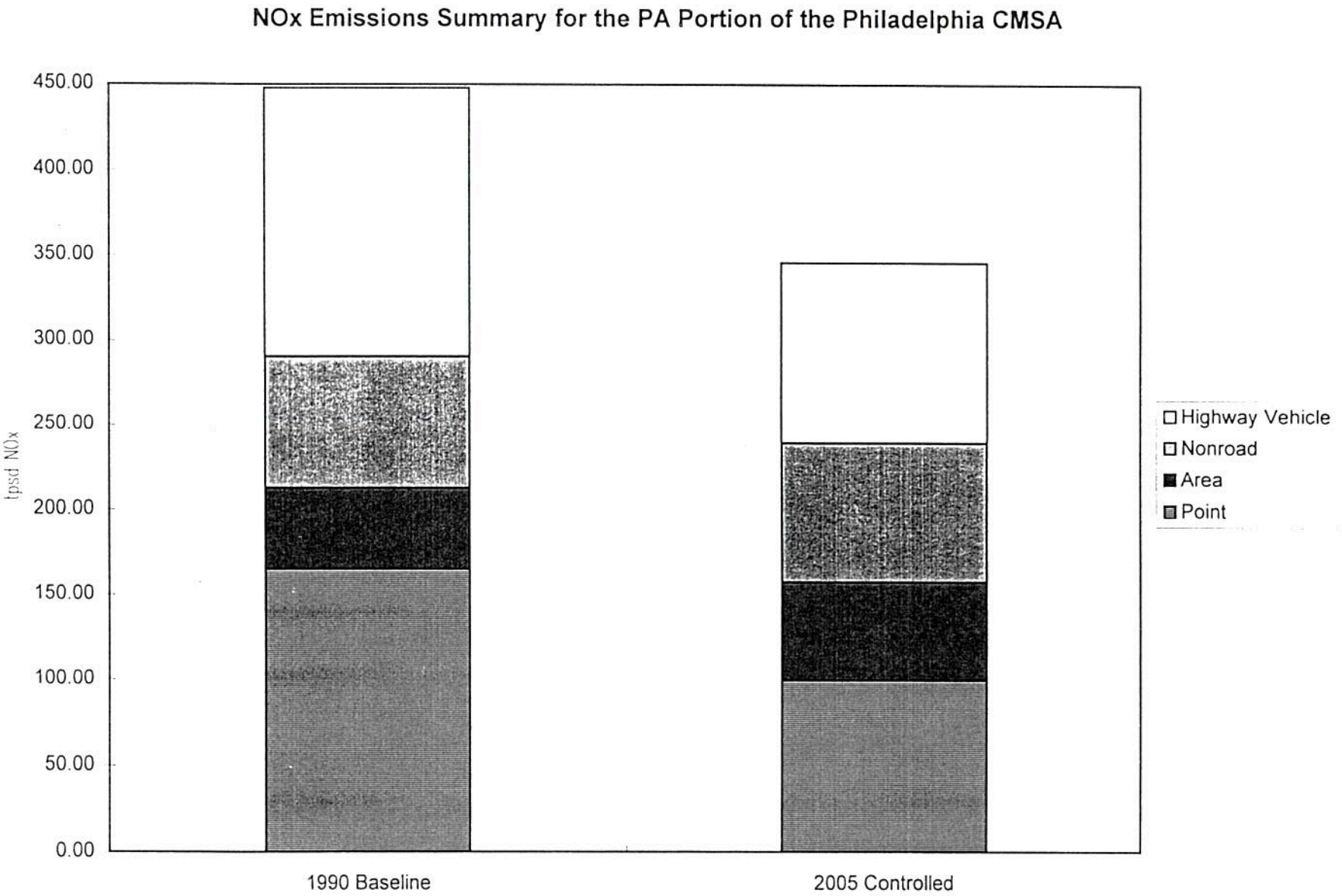
SIP Measures (NOx)		
Highway Vehicle	51.21	36%
Source and Process Shutdowns	3.96	3%
Boilers	86.78	61%
Total NOx Reductions:	**141.95**	

Emissions Summary for the PA Portion of the Philadelphia CMSA

VOC	1990 Baseline	1996 Controlled	2005 Controlled
Point	155.73	136.92	151.71
Area	204.81	183.77	196.61
Nonroad	80.56	81.33	95.43
Highway Vehicle	188.17	103.05	54.41
	629.27	**505.07**	**498.16**

NOx	1990 Baseline	2005 Controlled
Point	164.64	99.24
Area	47.88	58.01
Nonroad	77.85	82.27
Highway Vehicle	157.48	106.30
	447.84	**345.82**


VOC Emissions Summary for the PA Portion of the Philadelphia CMSA
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
tpsd VOC
1990 Baseline
1996 Controlled
2005 Controlled
Highway Vehicle
Nonroad
Area
Point


NOx Emissions Summary for the PA Portion of the Philadelphia CMSA
450.00
400.00
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
tpsd NOx
1990 Baseline
2005 Controlled
Highway Vehicle
Nonroad
Area
Point

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THE AUTOMOTIVE REFINISHING INDUSTRY AND VOC EMISSIONS: A PRESCRIPTION FOR THE CURE

In the United States, 150 million Americans live in areas that have air pollution levels considered unsafe by the Environmental Protection Agency (EPA). In fact, air pollution affects more than 150 urban areas throughout the nation. The EPA has designated almost 100 of these metropolitan regions as non-attainment areas to be the focus of comprehensive, often stringent, cleanup measures.

Air pollution is the product of various industrial and private activities, including automotive refinishing operations. Volatile organic compounds (VOCs), which make up the solvent in refinishing products, are believed to be a factor in the accumulation of smog-producing ozone in the lower atmosphere. The Clean Air Act was amended in 1990 to provide for increased protection and maintenance of national air quality standards, which are undermined by air pollutants such as VOCs. While the Act does not contain specific language calling for the regulation of VOC emissions in auto body repair facilities, it does mandate that states take steps to achieve a 15% reduction in total VOC emissions by 1996.

The Environmental Protection Agency (EPA) will issue a proposed national rule governing VOC emission standards for automobile refinish coatings. The rule will apply to refinish coatings manufactured or imported for sale or distribution in the United States. After the rule is final, paint manufacturers will be forced to comply with VOC grams-per-liter limits for each refinish product category. Manufacturers and importers would have four months from the date of promulgation of the rule to comply. EPA's action will also eliminates recordkeeping at the body shop. Point of sale controls on the distribution and sale of refinish products will not be included in the rule.

The Automotive Service Association (ASA) has always been committed to working with state and national legislatures and regulatory agencies on efforts to effectively protect the environment, while minimizing the compliance and cost impact to small businesses. In 1993, ASA created the Specialized Task Force for Environmental Concerns to address the environmental issues affecting the automotive refinishing industry, achieve consensus on policy positions and to preserve and promote the interests of its members and the industry. To this end, the group has developed model legislation to regulate the sale and use of motor vehicle paints, solvents, thinners, reducers, hardeners, additives and specialty coatings containing VOCs.

ASA stands in support of federal legislation comprised of

provisions enabling the states to ensure proper control of the transfer and use of VOC products. Specifically, ASA recommends that strong emphasis be given in three primary areas:

(1) product control throughout the distribution chain, with greater attention to the point of sale;

(2) shared record keeping responsibilities, which would include appropriate tracking and safeguarding by the manufacturers, distributors, wholesalers, retailers and end-users and;

(3) enhanced training beginning with the manufacturer and concluding with the end-user.

PRODUCT CONTROL

Proper control of the transfer and distribution of VOC products throughout the entire distribution and usage chain must be achieved before any meaningful reduction in emissions can be realized. Thus, it is essential that control points be established beginning with the manufacturer and concluding with the end user. It is only appropriate and fair that the manufacturers, distributors, wholesalers, retailers and end-users share equally in tracking and safeguarding the points of transfer.

Particular emphasis should be given to the wholesale and retail points of sale. Accordingly, ASA recommends the establishment of uniform federal regulations limiting the sale or transfer of VOC products to those who are properly able to sell, apply and dispose of such products and who can prove that they are properly trained in their use, handling and disposal. In addition, purchasers should be required to show proof of proper EPA permits and valid state and federal tax identification numbers and businesses licenses, where applicable.

Our information indicates that as much as 50% of the sales of automotive VOC products are sold to non-business or non-compliant entities. The legitimate repair industry should not be held accountable for VOC products we do not purchase or utilize. Product control at the point of sale would eliminate unaccountable VOC emissions by eliminating the usage of those who refuse or neglect to take steps by which their use can be measured.

RECORD KEEPING

To ensure compliance with regulations limiting the sale of VOC products to appropriate purchasers and to accurately account for product sold and used, basic and uniform rules regarding transfers and record keeping should be adopted and enforced in all areas of the U.S.

Many wholesalers and distributors of VOC products already possess the ability to maintain and process records of the VOC content and quantity of VOC products sold to individual purchasers.

These records could be standardized and simplified to include only the most relevant information. This information would include data identifying the purchaser, so as to allow regulating agencies to track the transfer and subsequent use of all products sold.

Commercial product users should maintain sales invoices for all VOC products used in their commercial endeavors. Purchasers who sell surplus product would be treated as distributors and be held to the same standards of accountability. Shared record keeping at each point of transfer would give regulating agencies a clear and accurate means to track total VOC emissions.

TRAINING

There is increasing diversity among the processes and technologies employed by individual automotive refinish shops. Some shops are fairly sophisticated in their application technologies and are using low VOC coatings. Many others are not, especially those that operate in areas that heretofore have not regulated VOC emissions from automotive refinishing facilities. Competing technological and economic considerations are involved in any attempt to establish regulations that advance lower VOC paints and coatings technology while ensuring that a large portion of the shops are not driven out of business because of the difficulties in using such coatings.

Accordingly, ASA believes that any professional involved with a commercial paint refinishing operation should complete an applicable training program emphasizing the care, handling and application of VOC products. There must be a method to objectively quantify the refinisher's capacity to safely and effectively apply and dispose of these products. If there is a lack of understanding as to the need and methods of compliance, then attainment of VOC emissions goals will never be achieved.

The objective of our model legislation is the development of nationally consistent VOC regulations that achieve significant and effective reductions in VOC emissions from automotive refinishing facilities. At the same time, we oppose unnecessary additional costs or losses in productivity to our member businesses. Toward this end, we will continue to work with various state and local air quality administrators and EPA in this ongoing process to effectuate fairly applied regulations. We have been active participants in EPA's efforts to develop a national rule for automotive refinishing operations and we believe that the enactment of our model provides the best and fairest means to achieve the federal government's stated goals, in the present and in the future.

We are encouraged by our progress. Last year, New York and Rhode Island introduced legislation in their state legislatures to limit the sale of motor vehicle paints to persons who are licensed to operate a body shop, or dealers who operate licensed shops. Currently, a point-of-sale ordinance is moving through the Austin

(Tex.) City Council that would establish the procedural means to limit the transfer of products containing VOCs to trained and certified technicians. In Indiana, an interim study committee is considering legislation to license professional automotive painters. ASA hopes to use this bill as a vehicle to attach point-of-sale restrictions.

Introduced by:_____
Referred to Committee on_____

A bill

to regulate the sale and use of motor vehicle paints, solvents, thinners, reducers, hardeners, additives and specialty coatings containing volatile organic compounds (VOCs).

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF_____:

Section 1 _____( ) (SALES OF CERTAIN MOTOR VEHICLE PAINTS REGULATED)

(a) No commercial entity engaged in the retail or wholesale sale of motor vehicle paints, solvents, thinners, reducers, hardeners, additives and specialty coatings may sell such products to any commercial entity purchaser without first determining that such purchaser has a state air quality permit if required, a federal tax identification number, and a valid state sales tax number and business license, when required by local county or city ordinances.

(b) All manufacturers, suppliers, wholesalers or distributors of such products as are regulated in paragraph (a) above shall be required to label such products in bold face type of not less than one half inch (1/2) high letters with the following:

"FOR PROFESSIONAL USE ONLY. NOT FOR SALE TO THE GENERAL PUBLIC."

Section 2 _____( ) (TRAINING)

No commercial entity providing professional paint refinishing services involving the use of motor vehicle paints, solvents, thinners, reducers, hardeners, additives and specialty coatings containing VOCs shall provide these services without first ensuring that each professional painter involved in the care, handling and application of such products has successfully completed any applicable manufacturer training program. Proof of any such training shall be kept at the commercial entity for 2 years.

Section 3 _____( ) (EQUIPMENT)

(a) All commercial entities providing paint refinishing services subject to this regulation shall apply coatings in a vehicle refinishing operation using a controlled air spray system (HVLP/LVLP) and shall operate the coating application equipment in

accordance with the equipment manufacturer's recommendations and in a manner that minimizes emissions of VOCs to the atmosphere.

(b) All commercial entities providing paint refinishing services subject to this regulation shall use enclosed containers or VOC recycling equipment to clean paint spray gun equipment; enclosed containers to store clean up and surface preparation materials containing VOCs and; enclosed containers to store contaminated cloth and paper.

Section 4 _____( ) (RECORDS)

(a) All commercial entities engaged in the retail or wholesale sale of such products as are regulated in Section 1 (a) shall: maintain a record of all information required of commercial entity purchasers in Section 1 (a); a record of the total volume of such products containing VOCs purchased monthly by commercial entity purchasers and; make these records available for inspection by the state for the previous 24 month period.

(b) All commercial entities providing professional paint refinishing services subject to this regulation shall: maintain records of sales invoices for all such products containing VOCs purchased for commercial use and; make these records available for inspection by the state for the previous 24 month period.

IN THE Y

Ozone levels are no sweat

With cool and wet summer, irritant hasn't been problem

By PATTI MENGERS
Of the Times Staff

At least 70 members can be counted as part of the Delaware Valley Regional Planning Commission's Ozone Action Partnership which encourages limiting use of automobiles and other behavior to reduce ground level ozone.

But the biggest unsung heroine of the group these days is Mother Nature.

With lots of wind and rain and not a day over 90 degrees in July, the formation of lung-threatening ground level ozone has been below average so far this summer said Ron Roggenburk, manager of the Delaware Valley Regional Planning Commission's air quality program.

"As a matter of fact it has been an exceedingly good year for ozone," said Roggenburk.

Delaware County with its riverfront industry, Interstate 95 and major air, train and shipping routes, is in the heart of a severe ground level ozone non-attainment area designated by the federal government based on data collected 1987 through 1989. The area, which stretches from Baltimore to New York City, has until the year 2005 to come into compliance with federal standards, noted Pennsylvania Department of Environmental Protection spokesman Clarke Rupert.

"Ground level ozone is a lung irritant that is especially dangerous to the very young, the very old and others with respiratory conditions such as asthma, emphysema and bronchitis," said Rupert.

But even healthy adults can be hampered by ground level ozone, noted Roggenburk. They can experience shortness of breath, chest pain, coughing, sore throat and burning eyes when ozone levels are high.

"It tends to reduce lung function and make a person not able to process as much oxygen," said Roggenburk.

In an effort to reduce the area's amount of ground level ozone and meet the federal air quality deadline, the Ozone Action Partnership was formed this year. It is coordinated by the Delaware Valley Regional Planning Commission which determines how federal transportation dollars are spent in the region and maintains a transportation plan and capital program for transportation improvement.

"This project was started because in the past we tried to control emissions all year long and were not meeting with a great deal of success. There are a hand full of days in the summer where we reach unhealthful levels so we decided to target those days," said Roggenburk.

The ozone action program provides the media, businesses, government offices, health facilities and other organizations with daily forecasts of ozone levels and alerts them to Ozone Action Days when, mainly because of the weather, ground level ozone is expected to reach unhealthful levels.

The ozone forecast originates from University of Maryland meteorologist William Ryan who processes information from 17 ozone monitors in the region including one in Chester at Front and Norris streets. Code Green is "good" with 62 parts per billion of ozone or less. Code Yellow is "moderate" with 63 to 109. Code Orange with 110 to 124 is "approaching unhealthful" and Code Red is "unhealthful" with 125 parts per billion or more.

On an ozone action day, people are encouraged to carpool or drive less, refuel after sundown, use water base instead of oil base paints, not use the barbecue, not cut the grass and avoid using other small engines, said Roggenburk.

Ground level ozone is formed by nitrogen oxides and volatile organic compounds such as hydrocarbons that are by-products of petroleum combustion and solvents such as xylene and toluene, reacting to heat and sunlight.

It should not be confused with stratospheric ozone which hovers seven miles above the earth and actually protects the earth from the dangerous ultraviolet B rays of the sun.

"Cars represent 25 percent of the problem. Another 25 percent or so is from large industrial sources. The rest is scattered from lawn mowers and other off-road vehicles such as tractors, trains, planes and ships," explained Roggenburk.

Hot, sunny and still weather is the ideal environment for formation of ground level ozone. Last year's sizzling summer produced 30 exceedances. So far, there have only been five exceedances this summer, said Clean Air Council Technical and Policy Analyst Alec Meltzer.

No exceedances have been reported so far this summer from the Chester monitor which, at about 2:15 p.m. Wednesday was recording ozone levels as low as 32 parts per billion, said Rupert.

"We've had a lot of cool weather, rain and a lot of wind which keeps the ozone levels quite low," noted Roggenburk.

Not only has the weather helped clear the air this summer, but improvements in cars and industrial processes have helped, said Roggenburk.

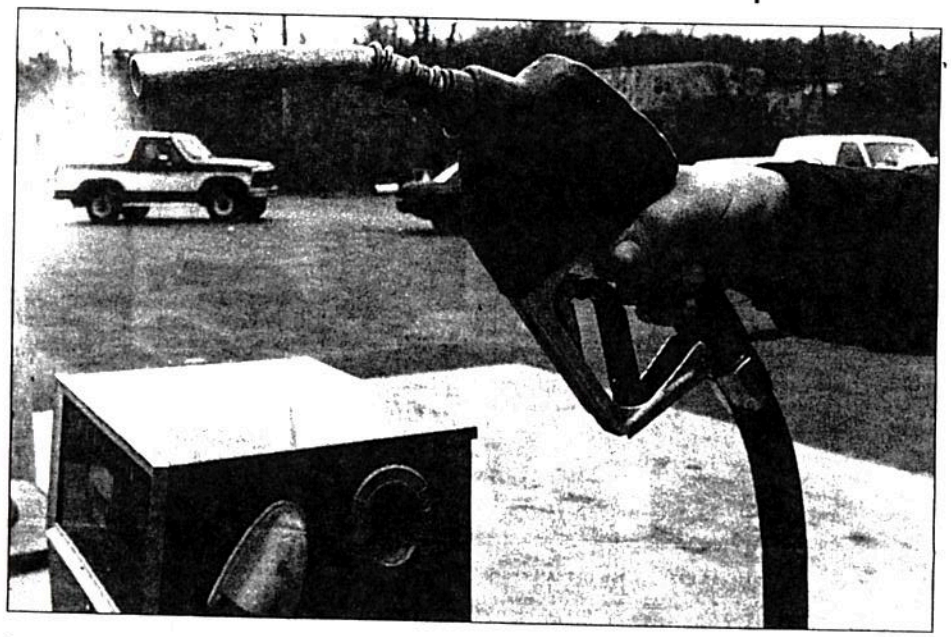
"Unfortunately part of the reduction in ozone from industrial sources is from industry leaving," he noted.

Less volatile petroleum products such as reformulated gas which has been pumped from Delaware County service stations since January 1995, also help reduce ozone, noted Rupert.

"Cars are just being made cleaner now. Things get better as the older cars are removed from the fleet and replaced with new ones," said Roggenburk. "Inspection and maintenance programs have helped."

A regionally-tailored plan to meet the federal health-based standards of the Clean Air Act is currently being formed by the 28 members of the Southeast Pennsylvania Ozone Stakeholders Working Group which includes representatives of environmental groups, government, industry and small business. The public is invited to the next meetings which are scheduled for 9 a.m. to 4 p.m. Aug. 8 and 8 a.m. to 3 p.m. Aug. 9 at the Holiday Inn, 4th and Arch streets, Philadelphia.

The public can access information about air quality, including five-minute averages of ozone, on the Internet at www.dep.state.pa.us, said Rupert.



Ozone in the atmosphere comes from a variety of sources including gasoline vapors. However, this summer's cooler and wetter weather has worked to keep ozone levels down.

> *"We've had a lot of cool weather, rain and a lot of wind which keeps the ozone levels quite low.*
>
> **RON ROGGENBURK**
> **Delaware Valley Regional Planning Commission**